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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/801,880	03/16/2004	Lars W. Liebmann	FIS920010274US2	4485
7590 11/03/2004				
IBM Corp. - Zip 482 2070 Route 52 Hopewell Junction, NY 12533				
EXAMINER ROSASCO, STEPHEN D				
ART UNIT		PAPER NUMBER		
1756				
DATE MAILED: 11/03/2004				

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/801,880

Applicant(s)

LIEBMANN ET AL.

Examiner

Stephen Rosasco

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 March 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 17-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 17-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 3/16/04.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

Detailed Action

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 17-20 are rejected under 35 U.S.C. 102(e) as being anticipated by Pierrat et al. (6,721,938).

The claimed invention is a divisional of a patented file, and is directed to a method for designing an alternating phase shifting mask (altPSM) for projecting an image on an image plane, the method comprising: providing a circuit layout; identifying a critical element of said circuit layout, said critical element having a layout dimension (LW), said layout dimension corresponding to a target image dimension in the image plane; providing a relationship between phase shape width and said target image dimension; selecting an optimal phase shape width so that said relationship has an optimal value; and generating a phase shape disposed adjacent to said layout dimension wherein said phase shape has said optimal phase shape width.

And wherein said relationship comprises across-chip line width variation (ACLV), and said selecting further comprises minimizing said ACLV. FIG. 3B illustrates the results of a simulation of process window, which is a function of focus and dose, assuming 0.75 NA (numerical aperture), illumination wavelength of 193 nm (using an ArF laser source), 0.35 Sigma (partial coherence of the tool), and a pitch (P) of 1300 nm. The process window curves are plotted for target image widths of TW0 (301), TW1 (302), and TW2 (303). It can be seen that for each target width, the optimal process window is obtained by using a different phase

width. The optimal phase widths for each of these target CDs are plotted in FIG. 3C. It can be seen that for a given target CD, the optimal phase shape width varies, thus current methods of assigning altPSM phase shapes, which specify fixed phase shape widths, do not necessarily result in an optimal process window. Similarly, image quality will also be impacted. One metric of image quality is the across-chip line width variation (ACLV), which is perhaps even more important to minimize since ACLV is a measure of overall chip quality. The optimal phase shapes that minimize ACLV will likewise vary with target image dimension.

Pierrat et al. teach (in claims 1 and 3) a method for producing a computer readable definition of a photolithographic mask or masks used to define a target pattern in a layer to be formed using the mask or masks, wherein said pattern includes a target feature; the method comprising: laying out a first mask pattern including phase shift windows having boundaries defined by line segments in the first mask layout, and a second mask pattern including trim shapes having boundaries defined by line segments in the second mask pattern, wherein in combination the first and second mask patterns are used for defining said target feature of said target pattern, a first phase shift window in the first mask pattern being defined by a plurality of line segments, including at least one line segment abutting the target feature and a second phase shift window in the first mask pattern being defined by a plurality of line segments, including at least one line segment abutting the target feature, and a trim shape including a transmissive region in the second mask pattern being defined by a plurality of line segments, including at least one line segment abutting the target feature, in which a shape caused by a phase transition between said first and second phase shift windows in the first mask pattern is cleared by said transmissive region in said trim shape in the second mask pattern; adjusting positions of said at least one line segment of said first phase shift window in said first mask pattern, and of said at least one line segment of said trim shape in said second mask layout to

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provide proximity correction; and storing a result of said laying out and said adjusting in a computer readable medium.

And wherein said first mask layout includes a pair of phase shift windows is arranged so that each of the phase shift windows in said pair includes a complementary phase shift window by which a phase transition is produced that results in formation of a least a part of said target feature, and including defining said line segments the first mask pattern by dissecting a boundary of at least one of the phase shift windows in said pair at a dissection point at a corner of the at least one of said phase shift windows which abuts an edge of said target feature, and defining line segments in the second mask pattern by dissecting a boundary of said trim shape at a dissection point at a corner of said trim shape which abuts an edge of said target feature.

Conclusion

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Stephen Rosasco whose telephone number is (571) 272-1389. The Examiner can normally be reached Monday-Friday, from 8:00 AM to 4:30 PM. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



S. Rosasco
Primary Examiner
Art Unit 1756

S. Rosasco
11/1/04